

**Table 2. Summary of Sequence Variations in *SHH***

Mutations	Sequence Change	Expected Effect	Type of Mutation	Reference
	160-161 insGCTG	3-4 ins	Insert with frameshift	<a href="#">Nanni et al 1999</a>
	189-196 del	13-15 del	Deletion with frameshift	<a href="#">Nanni et al 1999</a>
	91G→A	G31R	Missense	<a href="#">Roessler et al 1996</a>
	263→A	D88V	Missense	<a href="#">Nanni et al 1999</a>
	298C→T	Q100X	Nonsense	<a href="#">Roessler et al 1996</a>
	300G→C	Q100H	Missense	<a href="#">Odent et al 1999</a>
	313A→T	K105X	Nonsense	<a href="#">Roessler et al 1996</a>
	345C→A	N115K	Missense	<a href="#">Nanni et al 1999</a>
	349T→G	W117G	Missense	<a href="#">Roessler et al 1996</a>
	349T→C	W117R	Missense	<a href="#">Roessler et al 1996</a>
	474C→G	Y158X	Nonsense	<a href="#">Odent et al 1999</a>
	562G→C	E188Q	Missense	<a href="#">Odent et al 1999</a>
	625C→T	Q209X	Nonsense	<a href="#">Nanni et al 1999</a>
	664G→A	D222N	Missense	<a href="#">Odent et al 1999</a>
	671T→A	V224E	Missense	<a href="#">Roessler, Ward et al 1997</a>
	676G→A	A226T	Missense	<a href="#">Roessler, Ward et al 1997</a>
	708C→A	S236R	Missense	<a href="#">Nanni et al 1999</a>
	766G→T	E256X	Nonsense	<a href="#">Nanni et al 1999</a>
	939-959 del	263-269 del	Deletion in frame	<a href="#">Nanni et al 1999</a>
	939-959 del	263-269 del	Deletion in frame	<a href="#">Roessler, Ward et al 1997</a>

	850G→T	E284X	Nonsense	<a href="#">Roessler, Ward et al 1997</a>
	869G→A	G290D	Missense	<a href="#">Nanni et al 1999</a>
	1283-1291 del	378-380 del	Deletion in frame	<a href="#">Nanni et al 1999</a>
	1147G→A	A383T	Missense	<a href="#">Roessler, Ward et al 1997</a>
	1361-1375 del	404-408 del	Deletion in frame	<a href="#">Nanni et al 1999</a>
	1270C→G	P424A	Missense	<a href="#">Nanni et al 1999</a>
	1308C→T	S436L	Missense	<a href="#">Nanni et al 1999</a>
Polymorphisms	Sequence Change	Expected Effect	Frequency	Reference
	570G→A	S190S	2/344	<a href="#">Nanni et al 1999</a>
	585G→A	S195S	2/344	<a href="#">Roessler, Ward et al 1997</a>
	630C→T	G210G	1/344	<a href="#">Nanni et al 1999</a>
	825G→A	A275A	1/344	Present study
	876G→A	G292G	1/344	<a href="#">Roessler, Ward et al 1997</a>
	885C→T	S295S	1/344	<a href="#">Nanni et al 1999</a>
	1005G→A	V335V	2/344	Present study

## References

Nanni L, Ming JE, Bocian M, Steinhaus K, Bianchi DW, Die-Smulders C, Giannotti A, Imaizumi K, Jones KL, Campo MD, Martin RA, Meinecke P, Pierpont ME, Robin NH, Young ID, Roessler E, Muenke M (1999) The mutational spectrum of the sonic hedgehog gene in holoprosencephaly: SHH mutations cause a significant proportion of autosomal dominant holoprosencephaly. *Hum Mol Genet* 8:2479-88 [[Medline](#)]

Odent S, Atti-Bitach T, Blayau M, Mathieu M, Aug J, Delezo de AL, Gall JY, Le Marec B, Munnich A, David V, Vekemans M (1999) Expression of the Sonic hedgehog (SHH) gene during early human development and phenotypic expression of new mutations causing holoprosencephaly. *Hum Mol Genet* 8:1683-9 [[Medline](#)]

Roessler E, Belloni E, Gaudenz K, Jay P, Berta P, Scherer SW, Tsui LC, Muenke M (1996) Mutations in the human Sonic Hedgehog gene cause holoprosencephaly. *Nat Genet* 14:357-60 6:1847-53 [[Medline](#)]

Roessler E, Ward DE, Gaudenz K, Belloni E, Scherer SW, Donnai D, Siegel-Bartelt J, Tsui LC, Muenke M (1997) Cytogenetic rearrangements involving the loss of the Sonic Hedgehog gene at 7q36 cause holoprosencephaly. *Hum Genet* 100:172-81 [[Medline](#)]